

Chapter E1: Background

The San Francisco Bay and the Sacramento-San Joaquin River Delta combine to form the largest estuary along the U.S. Pacific Coast (Kennish, 2000). The San Francisco Bay/Delta Estuary supports numerous fish species that have shown substantial declines in recent years as a result of human activities, particularly extensive use and redistribution of freshwater inflow to the delta. A number of these species are currently threatened with extinction, including numerous native fishes that are vulnerable to impingement and entrainment by the cooling water intakes of the Pittsburg and Contra Costa power plants which are located in the delta (see Figure E1-1). In December 1997, the operator of these facilities entered into a Section 2081 Management Authorization with the California Department of Fish and Game pursuant to the California Endangered Species Act (ESA) to address state-listed species (Jones and Stokes, 1998). A multispecies Habitat Conservation Plan (HCP) is currently being drafted for the NMFS and the USFWS to request an incidental take permit under Section 10 of the federal ESA (Southern Energy Delta, LLC, 2000).

This case study discusses losses of fish species at the Pittsburg and Contra Costa plants and the potential economic benefits of reducing losses under 316(b) regulation. Economic valuation is based on other efforts to mitigate fish losses related to bay-delta water use.

E1-1 OVERVIEW OF CASE STUDY FACILITIES

The Pittsburg Power Plant is on the south shore of Suisun Bay, just west of the confluence of the Sacramento and San Joaquin rivers. The Contra Costa plant is on the south shore of the San Joaquin River about 8 km (5 miles) upstream of the Pittsburg plant in an industrial area near Antioch, about 96.6 km (60 miles) northeast of San Francisco. Both power plants generate electricity from steam turbines with boilers fueled by natural gas.

Pittsburg Power Plant

The Pittsburg plant is a 1,984 MW steam-electric power plant in the Western Systems Coordinating Council (WSCC). The plant began commercial service in 1954. It currently has seven active, natural gas-fired generating

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❖ *Threatened, Endangered, and Other Fish Species of Concern near the Pittsburg and Contra Costa Power Plants*

- ▶ Central Valley ESU steelhead, FT
- ▶ Central Valley fall/late fall run ESU chinook salmon, FCT
- ▶ Central Valley spring run ESU chinook salmon, FT, ST
- ▶ Delta smelt, FT, ST
- ▶ Green sturgeon, SOC
- ▶ Longfin smelt, SOC
- ▶ Sacramento River winter run ESU chinook salmon, FE, SE
- ▶ Sacramento splittail, FT

FT = federally listed as threatened.

ST = state listed as threatened.

FE = federally listed as endangered.

SE = state listed as endangered.

FCT = federal candidate listing as threatened

SOC = species of concern.

units¹: Units 1-6 use a once-through cooling system, and Unit 7 water is cooled through two mechanical-draft cooling towers and a cooling pond.

In 1998, Pittsburg had 139 employees and generated almost 5 million MWh of electricity (net of plant use). Estimated 1998 revenues for the Pittsburg plant were approximately \$445 million, based on the plant's 1998 electricity sales of 4.5 million MWh and the 1998 company-level electricity revenues of \$99.16 per MWh. Pittsburg's 1998 production expenses totaled over \$165 million, or 3.395 cents per kWh, for an operating income of approximately \$280 million.

Contra Costa Power Plant

The Contra Costa power plant is in the WSCC. Contra Costa consists of seven generating units divided into three facilities (Southern Energy Delta, LLC, 2000). All seven units rely on once-through cooling. Units 1-3 were built in 1951 and Units 4 and 5 were built in 1953. Units 6-7 were added in 1964. Currently, only Units 6 and 7 are regularly producing electricity for a total of 676 MW. Units 1-3 are on long-term standby and Units 4 and 5 are operated as synchronous condensers, providing power quality support but not power generation. A Unit 8 is currently planned (Steve Gallo, Project Manager, Pittsburg and Contra Costa Power Plants, personal communication, 9/18/00).

Contra Costa had 60 employees in 1998 and generated almost 1.9 million MWh of electricity (net of plant use). Estimated baseline revenues in 1998 were approximately \$173 million, based on the plant's 1998 estimated electricity sales of 1.7 million MWh and the 1998 company-level electricity revenues of \$99.16 per MWh. Contra Costa's 1998 production expenses totaled almost \$61 million, or 3.201 cents per kWh, for an operating income of approximately \$112 million.

Table E1-1 summarizes the plant characteristics of the Pittsburg and Contra Costa power plants.

Table E1-1: Summary of Pittsburg and Contra Costa Plant Characteristics (1998)		
	Pittsburg	Contra Costa
Plant EIA code	271	228
NERC region	WSCC	WSCC
Total capacity (MW)	1,984	676
Primary fuel	Gas	Gas
Number of employees	139	60
Net generation (million MWh)	4.9	1.9
Estimated revenues (million)	\$445	\$173
Total production expense (million)	\$165	\$61
Production expense (¢/kWh)	3.395	3.201
Estimated operating income	\$280	\$112

Notes: NERC = North American Electric Reliability Council
WSCC = Western Systems Coordinating Council
Dollars are in \$2001.

Source: Form EIA-860B (NERC Region, Total Capacity); FERC Form-1 (Primary Fuel, Number of Employees, Total Production Expense); Form EIA-906 (Net Generation).

Pittsburg and Contra Costa both began operation as regulated utility plants. Pacific Gas and Electric Company (PG&E) owned the two plants until April 1999, when they were sold to Southern Energy, Inc., a competitive energy provider and subsidiary of Southern Company. In September 2000, Southern Company announced the initial public offering of 66.7 million shares, or 19.7 percent, of common stock in Southern Energy, Inc. In January 2001, Southern Energy, Inc. changed its name to Mirant Corporation and became a fully independent, publicly traded company after completion of a spin-off from Southern Company in April 2001 (Mirant Corporation, 2001a).

¹ For the purposes of this analysis, "active" units include generating units that are operating, on standby, on cold standby, on test, on maintenance/repairs, or out of service (all year). Active units do not include units that are on indefinite shutdown or retired.

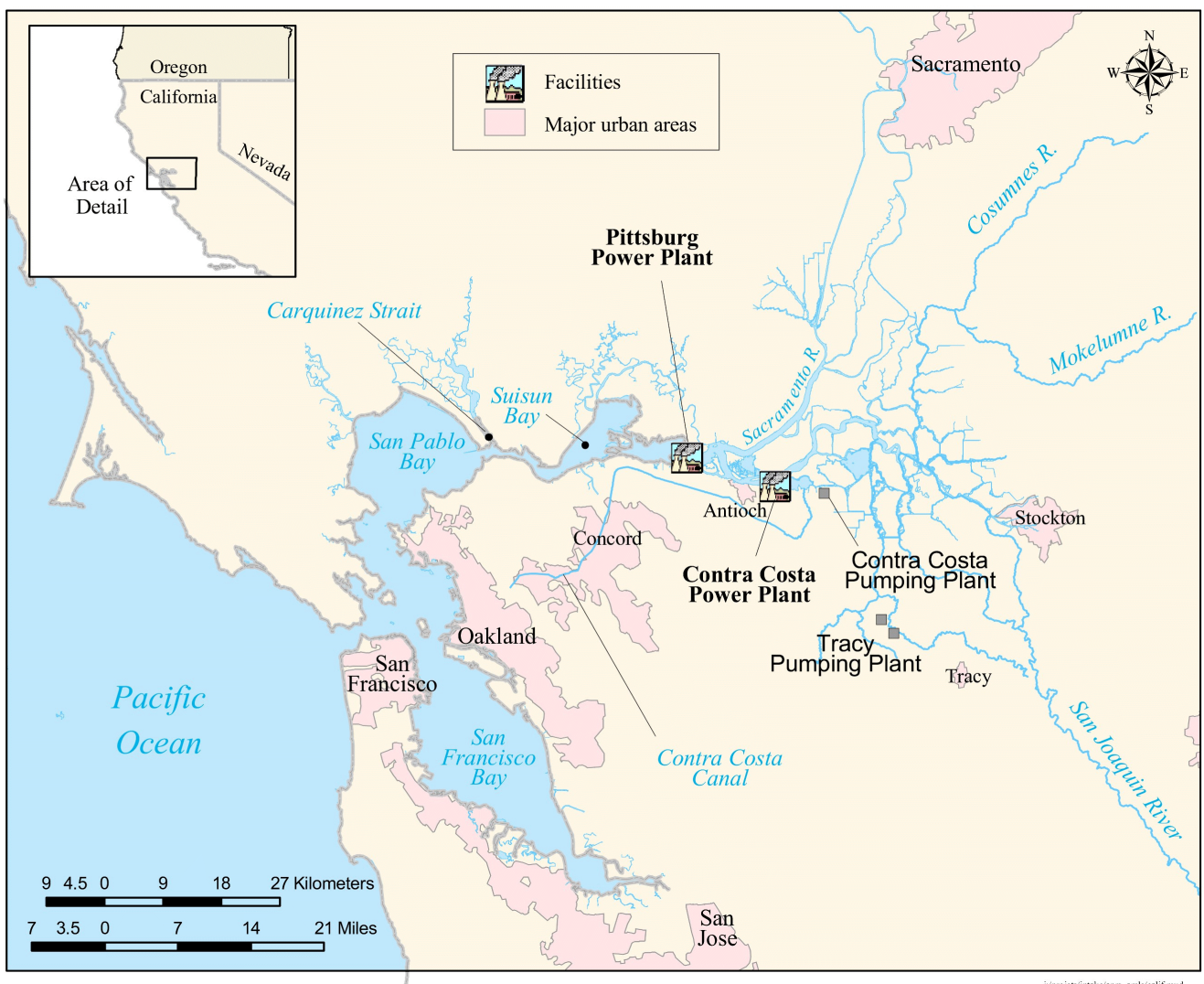
Mirant Corporation is a global, competitive energy company with 7,000 employees worldwide. Mirant owns or controls more than 20,000 MW of electric generating capacity and is developing another 9,000 MW (Mirant Corporation, 2001a). In 2000, Mirant posted revenues of \$13.3 billion and sold 186 million MWh of electricity (Mirant Corporation, 2001c).

E1-2 ENVIRONMENTAL SETTING

E1-2.1 The San Francisco Bay/Delta Estuary

The San Francisco Bay portion of the Bay-Delta Estuary consists of several distinct hydrographic segments (Kennish, 2000; Figure E1-1). From north to south these include Suisun Bay, Carquinez Strait, San Pablo Bay, central San Francisco Bay, and south San Francisco Bay. The Sacramento-San Joaquin River Delta is the northeastern-most portion of the estuary. It is a network of sloughs, marshes, channels, streams, and embayments that includes the northern delta (dominated by waters of the southward flowing Sacramento River), the southern delta (dominated by the waters of the northward-flowing San Joaquin River), and the eastern delta (dominated by the waters of the Cosumnes and Mokelumne rivers).

Figure E1-1: Locations of Facilities within the San Francisco Bay/Delta Estuary



Freshwater inflow and tidal exchange interact to determine salinity within the estuary (Kennish, 2000). Saltwater from adjacent coastal waters enters San Francisco Bay through the Golden Gate and freshwater enters the upper estuary from rivers of the Central Valley. The Sacramento River accounts for 80% of the total discharge from the Central Valley, and the San Joaquin River contributes 15%. Inputs of freshwater from the delta peak in winter and spring, lowering salinities in the

northern estuary, and sometimes in the southern estuary as far south as south San Francisco Bay. Reduced freshwater inputs in summer and fall result in greater saltwater intrusion from the bay into the delta. Deep channels such as the Carquinez Strait are characterized by strong up estuary bottom flows of saltwater.

In addition to the negative effects of reduced freshwater flows as a result of water diversions, the flow patterns created by water exports transport many larval and juvenile fish away from the delta (Chadwick et al., 1977). Although the pumping plant intakes are screened and large numbers of young fish are salvaged at the screens and returned to the estuary near Antioch, millions of eggs and larvae are entrained annually. Many millions more eggs and larvae are entrained in the siphons and pumps of local diversions, as well as in the CWIS of the Pittsburg and Contra Costa facilities, adding substantially to total fish losses (Ecological Analysts Inc., 1981a, 1981c).

E1-2.2 Aquatic Habitat and Biota

The diverse ecological conditions of the San Francisco Bay/Delta Estuary provide habitat for a wide variety of aquatic organisms, including 230 species of birds, 52 species of fish, and 45 species of mammals (Herbold and Moyle, 1989; Herbold et al., 1992). About half of the waterfowl and shorebirds that migrate along the Pacific Flyway and two-thirds of the state's salmon pass through the bay-delta estuary during their migrations. Many of the region's fish species support commercial or recreational fisheries within the estuary or nearby coastal waters.

The aquatic community in the vicinity of Pittsburg and Contra Costa is typical of freshwater to low salinity estuarine habitats (Herbold and Moyle, 1989; Herbold et al., 1992). As in the rest of the San Francisco Bay/Delta Estuary, aquatic life in this area is influenced by effects of water development on freshwater flows. When freshwater flow is low (<10,000 cfs), the brackish transition between salt and fresh water lies east of the Pittsburg plant, but when flows are high (>50,000 cfs), the transition occurs downstream in the Carquinez Strait or San Pablo Bay (Southern Energy Delta, LLC, 2000). Monthly salinity averages 0.1 to 5 ppt near the Pittsburg facility, but during drought periods, salinity can be as high as 12.6 ppt. Salinity near the Contra Costa plant typically varies from 0 to 1.5 ppt, reaching as high as 2.5 ppt.

The wide, shallow channels and brackish conditions of the estuary near the Pittsburg and Contra Costa facilities support abundant small invertebrates, such as mysid shrimp (*Neomysis mercedis*), that provide a rich food source for the more than 50 fish species that use the area as a nursery, rearing and feeding area (U.S. Fish and Wildlife Service, 1996b). A number of anadromous fish migrate through the area to the freshwater reaches of tributary rivers to spawn, including striped bass (*Morone saxatilis*), American shad (*Alosa sapidissima*), and white sturgeon (*Acipenser transmontanus*), as well as several special status species, including green sturgeon (*Ac. medirostris*), the Sacramento winter-run ESU chinook salmon (*Oncorhynchus tshawytscha*), the Central Valley ESU steelhead (*O. mykiss*), the Central Valley spring-run ESU chinook salmon, and the Central Valley fall/late fall run ESU chinook salmon (U.S. Fish and Wildlife Service, 1996b).² Suisun Bay, where the Pittsburg plant is located, is considered critical habitat for the endangered Sacramento winter-run ESU chinook salmon and the threatened delta smelt (*Hypomesus transpacificus*). Other special status species in the area include Sacramento splittail (*Pogonichthys macrolepidotus*) and longfin smelt (*Spirinchus thaleichthys*).

E1-2.3 Major Environmental Stressors

Altered flow regimes and decreased freshwater flows (as a result of water development), accelerating land development, exposure to pollutants, increased dredging and waterway modification, power plant operations, and competition from nonnative species have all contributed to marked declines in the native fish species of the San Francisco Bay/Delta Estuary (Herbold and Moyle, 1989; Herbold et al., 1992).

Urban development

The San Francisco Bay region is the fourth largest urban area in the United States. Approximately 30% of the land surrounding the bay and 10% of the land in the three delta counties is urbanized (Kennish, 2000). Because of its urban nature and associated nonpoint source runoff, a variety of contaminants impact the estuary. The estuary receives approximately 8.2 trillion to 65.8 trillion kg (9.07 million to 72.5 million tons) of pollutants annually. These include biological pollutants such as sewage, inorganic nutrients and metals, organic chemicals such as pesticides and solvents, and suspended solids. Many of

² ESU refers to “evolutionary significant unit.”

the contaminants in the estuary are carcinogenic or otherwise harmful, and there are concerns about the health effects of regular consumption of contaminated seafood in some areas of the bay.

Water development

Massive water development has created major stresses on the San Francisco Bay/Delta aquatic ecosystem over the past 50 years (Kennish, 2000). Today, the delta is the center of California's extensive water distribution system, providing over half of the state's supply of freshwater. The export of fresh water from the delta has increased steadily since the 1940s, when the federal Central Valley Project (CVP) began diverting water into the Contra Costa Canal. Still the largest water development project in the world, the CVP currently operates 20 dams and reservoirs, eight power plants, and about 500 miles of canals and aqueducts. In 1951, the federal Delta-Mendota Canal began to export delta water southward to farms in the San Joaquin Valley. In 1968, the SWP began exporting delta water into the California Aqueduct. The aqueduct conveys water southward into the San Joaquin Valley and Southern California. The project operates 22 dams and reservoirs and several hundred miles of canals and aqueducts. There are now more than 100 reservoirs in the Central Valley watershed, over 1,100 miles of Delta levees, and 2,000 water diversions from the Delta (Kennish, 2000).

Water development has had numerous major impacts on aquatic organisms of the San Francisco Bay/Delta Estuary, particularly fish species (Herbold and Moyle, 1989; Herbold et al., 1992; U.S. Fish and Wildlife Service, 1996b). Fish and aquatic food sources are entrained through diversion pumps, downstream transport of fish larvae and young juveniles to nursery areas is reduced, and migratory patterns are disrupted by "reverse flows." Reverse flows occur when freshwater inflow is low and pumping of water for export is high (Kennish, 2000). Under these conditions, the lower San Joaquin River changes direction and flows upstream.

Upstream diversions reduce freshwater flows through the delta to San Francisco Bay by an average of one-third of the total annual flow (Kennish, 2000). Historically, delta outflow was reduced by 50-70% in dry years, but recent standards set the maximum diversion at 35% from February through June and 65% from July through January (U.S. Fish and Wildlife Service, 1996b). Delta outflow is the amount of freshwater that flows downstream past Chipps Island into Suisun Bay. An index of outflow is calculated from the amount of delta inflow, exports from the delta by the CVP, SWP, and Contra Costa Canal, and depletions within the delta (CDWR, 1994).

Diversions and altered flow regimes affect salinity and flow patterns, concentrations of pollutants, and the biological productivity of the estuary (Kennish, 2000). Increased saltwater intrusion into northern reaches of the bay, particularly the western delta and Suisun Bay, is a now major threat to biological communities and the supply of freshwater for drinking and irrigation.

Because freshwater input regulates the estuary's salinity gradient, the amount of freshwater flow strongly influences the abundance and diversity of aquatic organisms (Kennish, 2000). When delta discharge is high and estuarine salinity is reduced, a stratified water column develops, which isolates phytoplankton in the photic zone where growth is enhanced. Increased production of phytoplankton in turn promotes production of other components of the estuarine food web. In contrast, when delta inflow is low, salinity increases and the water column is less stratified, reducing production of phytoplankton and the pelagic food web.

In addition to reducing the amount of delta outflow, water storage has also altered the timing of flows, which can have an even greater effect on biological productivity than reduced flow quantity alone (Herbold et al., 1992). Water stored during winter and spring months for release later in the year when flows are naturally low greatly reduces natural runoff from snowmelt in spring. Loss of high flows in spring have a number of negative consequences on estuarine production. Under natural conditions, high spring flows help flush contaminants out of the estuary, support migration and spawning of anadromous fish, and determine the location and productivity of the "entrapment zone" (Kennish, 2000). The entrapment zone (also referred to as the null zone) is where incoming ocean water mixes with freshwater flowing downstream, trapping nutrients and enhancing the growth of estuarine plants and animals.

In June 1994, federal and state agencies signed a Framework Agreement under the CALFED Bay-Delta Program to improve ecological conditions in the San Francisco Bay/Delta Estuary (CALFED, 2002). The agreement formally establishes cooperation in three major areas of Bay-Delta management:

- ▶ formulation of water quality standards
- ▶ coordination of SWP and CVP operations with regulatory requirements, and
- ▶ development of long-term solutions to bay-delta environmental problems.

Agreement on water quality standards was formalized in the Bay-Delta Accord of December 1994. The accord established:

- ▶ spring export limits expressed as a percentage of delta inflow,
- ▶ regulation of the estuary's salinity gradient so that a salt concentration of 2 ppt is located where it may be most beneficial to aquatic life,
- ▶ spring flows in the lower San Joaquin River to benefit chinook salmon, and
- ▶ intermittent closure of the Delta Cross Channel gates to reduce entrainment of fish into the delta.

Under the 1994 Bay-Delta Accord and the resulting 1995 State Water Quality Plan, a salinity standard was established based on relationships between salinity and the abundance and survival of various aquatic species (Kennish, 2000). The standard is expressed in terms of the so-called "X2," the distance from the Golden Gate to the upstream point where the average daily salinity is 2 ppt measured 1 m (3.3 ft) from the bottom (CALFED, 2002). The standard restricts the penetration of saltwater up estuary and the seasonal location of X2 in the delta. The amount of freshwater diverted to the CVP and the SWP is controlled so that the X2 remains near the Carquinez Strait.

Power plant operations

It is thought that the salinity standard will influence the seasonal distribution of special status fish species near the Pittsburg and Contra Costa power plants, including delta smelt, longfin smelt, chinook salmon, steelhead, and Sacramento splittail (PG&E, 1998). Analysis by CALFED's Interagency Ecological Program Estuarine Ecology Team predicted the following relationships among delta outflow, fish species distributions, and power plant operations:

In low outflow years, with a more upstream location of X2:

- ▶ Delta smelt may experience increased entrainment,
- ▶ Sacramento splittail may have a greater proportion of its population shifted upstream near the power plant intakes,
- ▶ Longfin smelt may experience increased entrainment because larvae would not be transported as far downstream and the brackish water nursery areas of San Pablo and Suisun bays would shift to the delta, and
- ▶ Chinook salmon and steelhead outmigrating smolts may move less rapidly downstream, increasing their exposure to power plant intakes.

Nonnative species

Accidentally introduced species have generally been quite successful in the San Francisco Bay/Delta Estuary, and dominate many habitats to the detriment of native species (Kennish, 2000). Most of the common macroinvertebrates in the bay were introduced, and exotic species constitute more than half of the fish in the delta area. Invertebrates such as the soft-shelled clam (*Mya arenaria*) and the Japanese littleneck clam (*Tapes japonica*) were introduced early in the 19th century, along with shipworms (*Teredo navalis*) and oyster drills (*Urosalpinx cinerea*). In addition, in recent years the introduced Asian clam (*Potamocorbula amurensis*) has decimated the planktonic food supply of invertebrates and young fish (Kennish, 2000).

E1-3 SOCIOECONOMIC CHARACTERISTICS

The Pittsburg and Contra Costa power plants are located in Contra Costa County. In 2000, the population of Contra Costa County was 948,816 (U.S. Census Bureau, 2001). It is more densely populated than Solano County, which borders Contra Costa to the north, but less densely populated than Sacramento County, which lies upstream (Table E1-2). Contra Costa has a lower unemployment rate and higher rate of home ownership than either of its neighboring counties.

Table E1-2: Socioeconomic Characteristics of Contra Costa and Neighboring Counties

	Contra Costa County	Solano County	Sacramento County
Population in 2000	948,816	394,542	1,223,499
Land area in 2000, km ² (mi ²)	720 (278)	829 (320)	966 (373)
Persons per square mile, 2000	1,318	476	1,267
Metropolitan Area	Oakland	Vallejo-Fairfield-Napa	Sacramento
Median household money income, 1997 model-based estimate	\$54,275	\$46,115	\$39,461
Persons below poverty, percent, 1997 model-based estimate	8.7%	11.3%	17.2%
Housing units in 2000	354,577	134,513	474,814
Homeownership rate in 2000	69.3%	65.2%	58.2%
Households in 2000	344,129	130,403	453,602
Persons per household in 2000	3	3	3
Households with persons under 18 years in 2000	38.8%	44.6%	37.3%
High school graduates, 25 and older in 1990	460,645	172,654	544,257
College graduates, 25 and older in 1990	168,205	39,125	151,880

Source: U.S. Census Bureau, 2001.

E1-3.1 Industrial Activities

Contra Costa County's work force is growing rapidly, largely because of companies relocating from more expensive locations in the Bay Area (Contra Costa County, 2002). The primary industries include petroleum refining, telecommunications, financial and retail services, steel manufacturing, chemicals, electronic equipment, and food processing. Industrial activity is primarily located along the Suisun and San Pablo bays to the north of the county. Industrial activity of note includes the largest petroleum refinery in the Bay Area, operated by Chevron Corporation, which operates its own wharf for receiving crude oil and shipping refined oil.

E1-3.2 Commercial Fishing

Commercial landings in the state of California between 1990 and 2000 were between 156 million kg and 319 million kg (343 million and 703 million pounds) and represented between \$110 and \$184 million annually (personal communication, National Marine Fisheries Service, Fisheries Statistics and Economics Division, Silver Spring, MD, 2002). The San Francisco Bay/Delta Estuary formerly supported important commercial fisheries in striped bass (*Morone saxatilis*), chinook salmon (*Oncorhynchus tshawytscha*), American shad (*Alosa sapidissima*), and starry flounder (*Platichthys stellatus*), however the commercial fisheries were all terminated by the 1950's (Kennish, 2000). Today, the estuary supports a major commercial roe fishery for Pacific herring (*Clupea harengus pallasi*), and smaller commercial bait fisheries in shiner perch (*Cymatogaster aggregata*), mudsucker (*Gillichthys mirabilis*), bullhead (*Ictalurus* sp.), and threadfin shad (*Dorosoma petenense*).

E1-3.3 Recreational Fishing

Expenditures for recreational fishing in California are estimated at over \$3 billion annually (Table E1-3) (California Department of Fish and Game, 2002a). This total includes money spent on fishing trips, equipment, fees, and other expenditures. The striped bass sport fishery is one of the most important on the Pacific Coast (Stevens, 1992). American shad, chinook salmon, and starry flounder are also valuable recreational species (Emmett et al., 1991). Pacific herring is caught by recreational fishermen as bait for other species (Spratt, 1992).

E1-3.4 Other Water-Based Recreation

San Francisco is one of the most popular urban tourist destinations in the United States, and tourism in the Bay Area brings in \$3-5 million annually (Kennish, 2000). In addition to fishing, water-based recreation in the San Francisco Bay/Delta Estuary includes hunting, boating, swimming, birdwatching, and numerous other recreational activities. Boating is a particularly large industry in the bay, where there are more than 200 marinas that generate more than \$50 million in annual revenue. The bay

and delta currently support 290 shoreline parks, 200 duck clubs, 300 marinas, and 500,000 recreational boaters (Kennish, 2000). The delta alone provides over 12 million user-days of recreation each year (Kennish, 2000).

Table E1-3: 1996 Annual California Angler Trip and Equipment Expenditures

Expenditure Item	Resident	Nonresident	Total
<i>Trip Expenditures</i>			
Food, drink and refreshments	\$341,095,262	\$16,032,627	\$357,127,890
Lodging	\$114,297,328	\$6,269,732	\$120,567,060
Public transportation	\$19,928,061	\$18,467,016	\$38,395,077
Private transportation	\$274,779,949	\$13,244,966	\$288,024,914
Boat fuel	\$104,572,179	\$2,075,959	\$106,648,138
Guide fees, pack trip or package fees	\$46,295,514	\$11,227,618	\$57,523,133
Public land use or access fees	\$25,779,489	\$446,044	\$26,225,532
Private land use or access fees	\$5,422,403	\$73,144	\$5,495,548
Boat launching fees	\$82,662,540	\$118,076	\$82,780,616
Boat mooring, storage, maintenance and insurance	\$223,721,709	\$905,019	\$224,626,728
Equipment rental	\$28,817,277	\$1,414,265	\$30,231,542
Bait (live, cut, prepared)	\$79,002,176	\$1,879,133	\$80,881,309
Ice	\$25,924,980	\$523,501	\$26,448,482
Heating and cooking fuel	\$9,114,086	\$234,482	\$9,348,567
<i>Fishing Equipment Expenditures</i>			
Rods, reels, poles and rod making components	\$218,753,011	\$3,550,708	\$222,303,719
Lines and leaders	\$45,754,939	\$875,075	\$46,630,014
Artificial lures, flies, baits and dressing	\$66,491,927	\$683,423	\$67,175,350
Hooks, sinkers, swivels, etc.	\$30,048,369	\$574,512	\$30,622,881
Tackle boxes	\$6,585,954	\$215,732	\$6,801,686
Creels, stringers, fish bags, landing nets and gaff hooks	\$6,250,785	\$183,693	\$6,434,478
Minnow traps, seines and bait containers	\$3,194,462	\$0	\$3,194,462
Depth finders, fish finders and other electronic fishing devices	\$21,987,930	\$44,350	\$22,032,280
Ice fishing equipment	\$0	\$0	\$0
Other fishing equipment	\$43,619,641	\$1,991,731	\$45,611,372
<i>Auxiliary Purchases for Fishing</i>			
Camping equipment	\$61,427,200	\$147,997	\$61,575,197
Binoculars, field glasses, telescopes, etc.	\$4,337,705	\$0	\$4,337,705
Special fishing clothing, foul weather gear, boots, waders, etc.	\$45,167,662	\$523,710	\$45,691,372
<i>Special Equipment Purchased for Fishing</i>			
Bass boat	\$116,393,467	\$0	\$116,393,467
Other motor boat	\$15,456,806	\$0	\$15,456,806
Canoe or other non-motor boat	\$10,576,962	\$0	\$10,576,962
Boat motor, boat trailer/hitch or other boat accessories	\$37,126,881	\$0	\$37,126,881
Pickup, camper, van, travel or tent trailer, motor home, House trailer	\$838,355,866	\$33,552,316	\$871,908,182
Cabin	\$0	\$0	\$0
Trail bike, dune buggy, 4x4 vehicle, 4-wheeler, snowmobile	\$111,170,400	\$0	\$111,170,400
Other special equipment including ice chest	\$12,934,383	\$225,839	\$13,160,222

Table E1-3: 1996 Annual California Angler Trip and Equipment Expenditures (cont.)

Expenditure Item	Resident	Nonresident	Total
<i>Other Expenditures</i>			
Fishing license fees	\$45,759,247	\$2,333,070	\$48,092,316
Other fees	\$4,651,899	\$220,357	\$4,872,256
Owned or leased property	\$24,518,910	\$0	\$24,518,910
Processing and taxidermy costs	\$2,223,408	\$0	\$2,223,408
Books and magazines	\$18,182,419	\$782,758	\$18,965,177
Dues or contributions to organizations	\$26,595,059	\$11,698	\$26,606,757
Other purchases	\$6,449,731	\$102,671	\$6,552,403
STATE TOTALS	\$3,205,427,980	\$118,931,219	\$3,324,359,199

Source: California Department of Fish and Game, 2002a.